WHAT IS CLAIMED IS:

1. A method for applying a solderable, corrosion-resistant, tin-based coating having a resistance to tin whisker formation onto a metal surface of an electronic component, the method comprising:

depositing a first metal layer onto the metal surface, wherein the first metal layer comprises a metal or alloy which establishes a diffusion couple with the tin-based coating that promotes a bulk material deficiency in the tin-based coating and, thereby, an internal tensile stress in the tin-based coating; and

depositing the tin-based coating over the first metal layer to a thickness between about 0.5 μm and about 2.5 μm.

2. The method of claim 1 wherein the first metal layer is a Ni-based material.

3. The method of claim 1 wherein the metal surface of the electronic component is a metal selected from the group consisting of copper, copper alloys, iron, and iron alloys.

4. The method of claim 1 wherein the first metal layer is a Ni-based material and has a thickness between about 0.1 μm and about 20 μm.

5. The method of claim 1 wherein the first metal layer is a Ni-based material and has a thickness between about 0.1 μm and about 3 μm.

6. The method of claim 1 wherein the electronic component is a lead line of an electronic package for incorporation into an electronic device.

7. The method of claim 1 wherein the electronic component is a lead line of an electronic package for incorporation into an electronic device, and the method comprises:

depositing the first metal layer onto the metal surface of the lead line, wherein the first metal layer has a thickness between about 0.1 and about 20 μm and is a Ni-based material which establishes said diffusion couple with the tin-based coating that promotes said bulk material deficiency in the tin-based coating and, thereby, said internal tensile stress in the tin-based coating; and

depositing the tin-based coating over the first metal layer to the thickness between about 0.5 μm and about 2.5 μm.

8. The method of claim 1 wherein the electronic component is a lead line of an electronic package for incorporation into an electronic device, and the method comprises:

depositing the first metal layer onto the metal surface of the lead line, wherein the first metal layer has a thickness between about 0.1 and about 20 μm and is a Ni-based material which establishes said diffusion couple with the tin-based coating that promotes said bulk material deficiency in the tin-based coating and, thereby, said internal tensile stress in the tin-based coating; and

depositing the tin-based coating over the first metal layer to the thickness between about 0.5 μm and about 2.0 μm.

9. The method of claim 1 wherein the electronic component is an electrical connector, and the method comprises:

depositing the first metal layer onto the metal surface of the electrical connector, wherein the first metal layer is a Ni-based material which establishes said

diffusion couple with the tin-based coating that promotes said bulk material deficiency in the tin-based coating and, thereby, said internal tensile stress in the tin-based coating; and

depositing the tin-based coating over the first metal layer to the thickness between about 0.5 μm and about 2.5 μm.

10. The method of claim 1 wherein the electronic component is an electrical connector, and the method comprises:

depositing the first metal layer onto the metal surface of the electrical connector, wherein the first metal layer is a Ni-based material which establishes said diffusion couple with the tin-based coating that promotes said bulk material deficiency in the tin-based coating and, thereby, said internal tensile stress in the tin-based coating; and

depositing the tin-based coating over the first metal layer to the thickness between about 0.5 μm and about 2.0 μm.

11. The method of claim 1 wherein the electronic component is a passive electronic device.

12. The method of claim 1 wherein the electronic component is a chip capacitor or a chip resistor.

13. The method of claim 2, 3, 4, 7, 8, 9, or 10 wherein the first metal layer Ni-based material further comprises P in an amount of less than about 0.5% by weight.

14. The method of claim 2, 3, 4, 7, 8, 9, or 10 wherein the first metal layer Ni-based material further comprises P in an amount between about 0.1% and about 0.4% by weight.

15. The method of claim 2, 3, 4, 7, 8, 9, or 10 wherein the first metal layer Ni-based material is formed by electrodeposition from a bath comprising Ni ions and between about 5 and about 12 ml/L of a P-based additive.

16. A method for applying a solderable, corrosion-resistant, tin-based coating having a resistance to tin whisker formation onto a metal lead line for attachment by soldering in assembly of an electronic device, the method comprising:

depositing a first metal layer onto the metal lead line, wherein the first metal layer comprises a metal or alloy which establishes a diffusion couple with the tin-based coating that promotes a bulk material deficiency in the tin-based coating and, thereby, an internal tensile stress in the tin-based coating; and

depositing the tin-based coating over the first metal layer to a thickness between about 0.5 μm and about 4.0 μm.

17. The method of claim 16 wherein depositing the tin-based coating has a thickness between about 0.5 μm and about 3.0 μm, and wherein the first metal layer is a Ni-based material.

18. The method of claim 17 wherein the metal lead line onto which the first metal layer and tin-based coating are deposited constitutes a segment of a lead frame to be incorporated into the electronic package.

19. The method of claim 18 wherein:

the depositing the first metal layer comprises depositing the Ni-based material to a thickness between about 0.1 and about 20 μm.

20. The method of claim 18 wherein:

the depositing the first metal layer comprises depositing the Ni-based material to a thickness between about 0.1 and about 3 μm.

21. The method of claim 19 or 20 wherein the first metal layer Ni-based material further comprises P in an amount of less than about 0.5% by weight.

22. The method of claim 19 or 20 wherein the first metal layer Ni-based material further comprises P in an amount between about 0.1% and about 0.4% by weight.

23. The method of claim 19 or 20 wherein the first metal layer Ni-based material is formed by electrodeposition from a bath comprising Ni ions and between about 5 and about 12 ml/L of a P-based additive.

24. A method for applying a solderable, corrosion-resistant, tin-based coating having a resistance to tin whisker formation onto a metal lead line of a lead frame for attachment by soldering in assembly of an electronic device, the method comprising:

depositing a first metal layer Ni-based material onto the metal lead line, wherein the first metal layer Ni-based material has a thickness between about 0.1 and about 3 μm, comprises Ni and between about 0.1% and about 0.4% by weight P, and establishes a diffusion couple with the tin-based coating that promotes a bulk material deficiency in the tin-based coating and, thereby, an internal tensile stress in the tin-based coating; and

depositing the tin-based coating over the first metal layer to a thickness between about 0.5 μm and about 3.0 μm.

25. A metal lead line for attachment by soldering of an electronic device in the assembly of an electronic package, wherein the lead line comprises a metal line with a Ni-based metal layer thereover and tin-based coating over the Ni-based metal layer, wherein the Ni-based metal layer has a thickness between about 0.1 μm and about 20 μm and the tin-based coating has a thickness between about 0.5 μm and about 3.0 μm, wherein the Ni-based metal layer establishes a diffusion couple with the tin-based coating that promotes a bulk material deficiency in the tin-based coating and, thereby, an internal tensile stress in the tin-based coating which inhibits whisker formation in the tin-based coating.

26. The metal lead line of claim 25 wherein the Ni-based metal layer comprises Ni and further comprises P in an amount of less than about 0.5% by weight.

27. The metal lead line of claim 25 wherein the Ni-based metal layer comprises Ni and further comprises P in an amount between about 0.1% and about 0.4% by weight.